



# Innovative Technologies and Engineering Solutions for Repair & Replacement of Legacy Pipe



ISO 9001:2008 Certified

# Agenda

- **Internal Sealing of Pipeline Joints**
- **Pipeline Liners**
- **Sewer Camera Program**
- **GIS/GPS As-Built Technology**
- **Summary of Gaps and Solutions**

# Internal Sealing of Pipeline Joints



- **Large Diameter Cast Iron Main Viable Option Due to Minimal Deterioration**
- **Natural Gas Dries Out Joint Packing - Joints are Weak Point**
- **Proven and Economical Solution to Joint Leakage**
- **Repairs Joints and Prevents Future Leaks Leading to an Extended Lifetime for Cast Iron Mains**
- **Solution Providers**
  - **ULC Robotics (CISBOT) – Liquid Anaerobic Sealant**
  - **Miller Pipeline Corporation (WEKO Seal) – Flexible Rubber Leak Clamps**

# Internal Sealing Solutions



## CISBOT®

- 16”-36” Cast Iron Mains
- Robotic Technology
- 25 PSI MAOP for Natural Gas Line
- Live Sealing-No Shut Down Required
- 1200’ Sealed From a Single Excavation
- Sealant Provides a 50-year Effective Life
- 360° Rotation-Complete Seal Around Joints
- Cannot Traverse Fittings, Valves, etc.

### Challenges

- Applies to very specific size and material type
- Allows very old pipe to remain in system vs. replacement with new

## WEKO Seal®

- 16” and Larger Cast Iron Mains
- Qualified Techs. Enter Pipe and Install Seal
- 60 PSI MAOP for Natural Gas Lines
- Gas Must Be Shut Down
- 5000’ Sealed Between Access Points
- Permanent Noncorrodible Seal
- Can Navigate per Typical Human Movements
- Can Traverse Some Fittings

# EN Engineering Recent Internal Sealing Projects

- **CISBOT**

- Repaired 16"-24" 1914 Cast Iron Pipe
- In Urban Environment on the East Coast- 3,010' of Pipe Repaired
- Pipeline Feeds Large International Airport, So Total Shutdown Not an Option



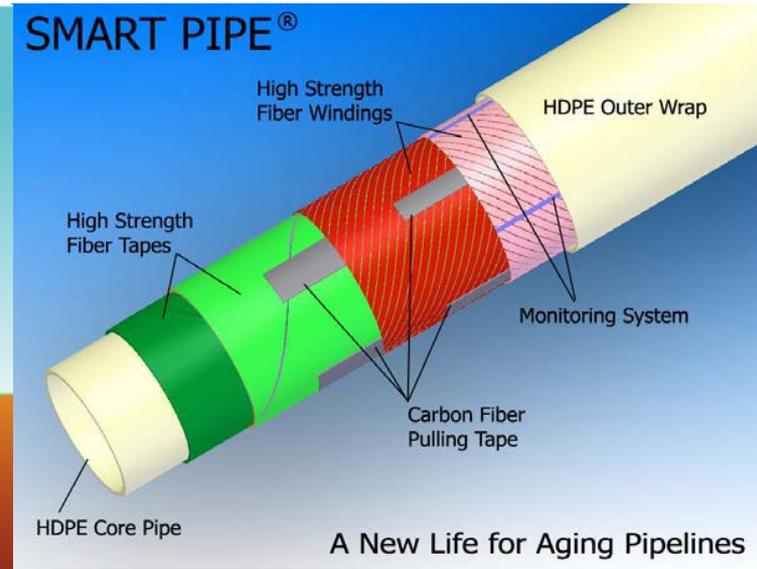
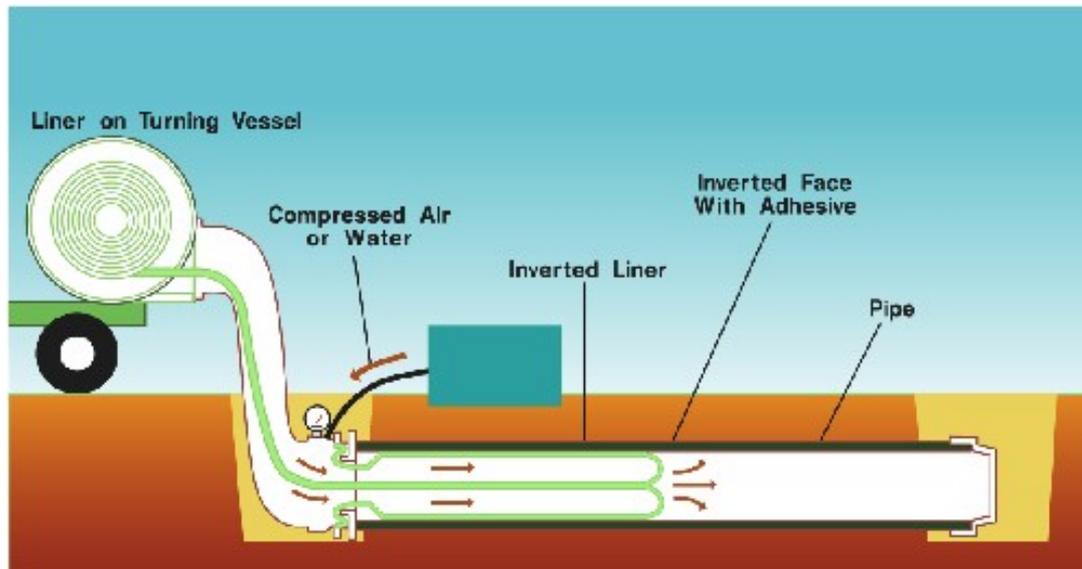
- **WEKO Seal**

- Repaired 24"-30" 1874 Cast Iron Pipe
- In a Major Metropolitan East Coast City- 2,280' of Pipe Repaired
- Due to Traffic and Congestion of City Utilities, WEKO Seal Provided A Convenient Fix



# Pipe Liners

- Rehabilitation of pipe requires minimal excavation and restoration
- These flexible liners can be installed even in pipes with bends
- Even if the pipe is broken or damaged, the fabric hose remains gas-tight
- Gas cannot migrate due to the fact that the liner uniformly bonds to the pipe.



# Pipe Liner Solutions

## Starline®

- Polyester Fabric with a Plastic Coating
- Used in Steel and CI pipes
- Diameters of 1" to 24"
- Restores Pipeline to Full Pressure Rating
- Operating Lifetime that Exceeds 50 Years
- Up to 2,000' in a Single Pull
- 90 psi (Warm Hardened) 12 - 16 Hours
- 250 psi (Cold Hardened) 1½ working days

## Smart Pipe®

- High Pressure Reinforced Thermoplastic Pipe (RTP)
- Used in Steel Pipes
- Diameters of ½" to 6"
- Restores Pipeline to Full Pressure Rating
- Renews Condition to Like New or Better
- Up to 50,000' in a Single Pull
- Operating Pressure of 150-1000 psi
- Provides for Continuous Monitoring and Inspection

### Challenges

- Strict tolerance on the OD of lining can cause issues when inserting in a pipeline with varied wall thicknesses
- Pipeline must be shut down in order to install liner
- Consensus needed on if lined pipe will be treated as new or repaired

# EN Engineering Recent Pipe Liner Project

## Smart Pipe<sup>®</sup> Project Example: Illinois River Crossing

- Project was under a large river and would have been a very costly rock bore to replace the existing pipes
- Repaired 6" Steel Pipe - MOP 230psig
- 5,790' of pipe installation
- The pipe can be manufactured on or off site, truck weight limits in the area of the project required on-site manufacturing
- Challenges Encountered
  - On-Site Plant Required Significant Amount of Space
  - Inserting the Lining into Pipe with Varied Wall Thicknesses
  - Obstructions in the Pipe Destroyed Pigs



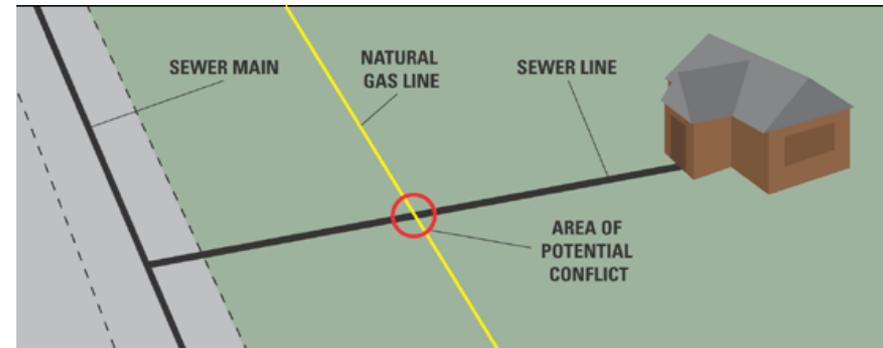
# Sewer Lateral Camera Program



- **When Cross Boring, Breaches of Sewer and Sanitation Lines Can Occur**
- **If Gas Lines Breach Sewer Lines, Leaks Can Cause Safety Concerns**
- **To Mitigate Concerns Sewer Lateral Camera Inspection Is Used**
- **Work is Collaborated Between Gas Companies and Sewer Districts to Limit Possible Breaches**

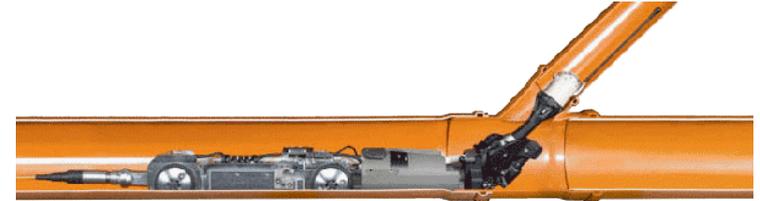
# Sewer Lateral Camera Capabilities

- **Trunk Line Cameras - 600 Feet**
- **Auxiliary Cameras into Laterals - 80 Feet**
- **Push Cameras from House - 200 Feet**
- **Sewer Main Depth is Collected Prior to Gas Installation**
- **If Sewer Main Has Less Than 8 Feet of Cover, Potential Conflict with Bore Path Exist**
- **Houses With Bottom of Front Door 4 Feet Above Street Level Indicate Rising Laterals**



# Sewer Lateral Camera Work Process and Improvements

- **Pre-Installation**
  - Typically for Locating Purposes Only
  - Potential Issues Include:
    - Vertical Taps for Sanitation Laterals
    - Laterals Filled With Water
    - No Clean Outs On the Laterals
- **Post-Installation**
  - Post Camera Videos Taken in PACP or LACP Format To Show Completed Work With No Obstructions Or Compromised Pipe
  - Prior to Gassing Up the Camera Contractor Gives an All Clear Affidavit
- **Other Methods Utilized For Locating Facilities**
  - Conventional Locating Devices
  - Excavation
  - Listening Devices
- **Challenges**
  - Similar Technologies for Locating Other Utilities (Water, Telecom, Gas, etc.) Would be Beneficial
  - Most Data Collected has One Time Use. Could be Used to Improve GIS Mapping



# GIS/GPS As-built Solutions

GIS and GPS can quickly capture, manage, display, and analyze spatial and tabular data making it a powerful tool in As-building.

**Creates Cost Savings Through:**

- **Increase in Accuracy** - Collection of data is processed through GPS protocols, making it more accurate than manual measurements
- **Time Frame Compression** - Data collected in the field updates GIS in a “real-time” environment.
- **Increase in Integrity** - Data that is recorded has a value of integrity. Metadata is recorded on the fly and can be referred to when making decisions on legacy data
- **Tracking and Traceability** - Information on location, materials, and installation methods can be captured in field and directly tied to data points for easy tracking



# GIS/GPS Current Industry Applications and Challenges

## Industry Applications:

- **Questar – Uses CartoPac to collect geographical data and do billing/invoices**
- **EN Engineering – Testing CartoPac based solution for inspecting/as-builting**
- **GTI – Developed solution for as-builting with material bar code and fusion scanning capabilities**

## Challenges:

- **Matching the existing GIS system with new GPS data - There will be a need for a QC check to make educated decisions on data validity**
- **All Inclusive Solution – Current solutions are a hybrid of several different hardware and software technologies**
- **Deliverable Standardization - Achieving uniformity in data collection from all parties (internal and external)**

# Summary of Challenges

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## Sewer Camera Program

- Similar technologies for locating other utilities (Water, Telecom, Gas, etc.) would be beneficial
- Most data collected has one time use. Information could be used to improve GIS Mapping

## GIS/GPS As-built Solution

- Process needed for matching existing GIS system with new GPS data
- All inclusive solution needed
- Deliverable standardization